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The decoupling strategy for the determination of α_s

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The decoupling strategy by the ALPHA collaboration uses simultaneous decoupling of $N_{\mathrm{f}} = 3$ heavy quark flavours to obtain a controlled connection between the Λ-parameters in QCD with $N_{\mathrm{f}} = 3$ and $N_{\mathrm{f}} = 0$ quark flavours, respectively, in terms of a common decoupling scale. Corrections are either power suppressed in the heavy quark mass, or perturbatively suppressed by powers of α_s at the scale of the heavy quark mass. In this talk I review the theoretical formalism (for results cf.˜subsequent talk by R.˜H\"ollwieser).

The Symanzik effective theory and the heavy quark mass expansion are combined and analyzed using recent results by Husung et al. on the leading logarithmic modifications of powers in a or the inverse quark mass. The application to finite volume couplings in a gradient flow scheme, together with perturbative 4-loop results on decoupling from the literature, then yield the basis for the analysis of the continuum and decoupling limits.

Primary authors: DALLABRIDA, Mattia (CERN); HÖLLWIESER, Roman (University of Wuppertal); KNECHTLI, Francesco (University of Wuppertal); KORZEC, Tomasz (University of Wuppertal); NADA, Alessandro (Deutsches Elektronen-Synchrotron DESY); RAMOS MARTINEZ, Alberto (Univ. of Valencia and CSIC (ES)); SINT, Stefan (Trinity College Dublin); SOMMER, Rainer Paul (DESY)

Presenter: SINT, Stefan (Trinity College Dublin)

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